APPENDIX V

Serial No.: 09/520,032

Docket No.: 49933US031

Continued Prosecution Application under 37 C.F.R. § 153(d) with Preliminary Amendment filed with the U. S. Patent and Trademark Office on August 23, 2001.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Docket Number	Anticipated Classification		Prior Application	
	Class	Subclass	Examiner	Art Unit
49933USA6H031			Joseph Leyson	1722

REQUEST FOR CONTINUED PROSECUTION APPLICATION UNDER RULE 1.53(d)

Assistant Commissioner for Patents
ATTN: Box CPA
Washington, DC 20231

Sir:

This is a request for filing a continued prosecution application under 37 CFR §1.53(d) of prior application Serial No. 09/520,032, Confirmation No. Unknown, filed on 6 March 2000, entitled TOOLS TO MANUFACTURE ABRASIVE ARTICLES by the following inventor(s):

Timothy L. HOOPMAN
Residence: City of River Falls, State of Wisconsin, U.S.A.
Citizenship: United States of America
Post Office: P.O. Box 33427
Address: St. Paul, Minnesota 55133-3427

Nelson D. SEWALL
Residence: City of Forest Lake, State of Minnesota, U.S.A.
Citizenship: United States of America
Post Office: P.O. Box 33427
Address: St. Paul, Minnesota 55133-3427

The above-identified prior application in which no payment of the issue fee, abandonment of, or termination of proceedings has occurred, is hereby expressly abandoned as of the filing date of this new application. Please use all the contents of the prior application file wrapper, including the drawings, as the basic papers for the new application.

1. ___ Enter the amendment previously filed on _____ under 37 CFR §1.116 but unentered, in the prior application.

2. X Please cancel claims 1-16, 18, 22-24, 29-32, 88-93, 97, and 112-132.

3. X A preliminary amendment is enclosed (the filing fee calculation includes any new claims).

4. X The filing fee is calculated below:

CLAIMS AS FILED				
NUMBER FILED		NUMBER EXTRA	RATE	BASIC FEE $710
Total Claims	40-20 =	20	$18	$360
Independent Claims	38-3 =	35	$80	$2800
MULTIPLE DEPENDENT CLAIM PRESENTED			$270	$0
			FILING FEE:	$3870

5. X The Commissioner is hereby authorized to charge any additional fees as set forth in 37 CFR §1.16 to 1.18 which may be required such as an extension of time in the parent application or credit any overpayment to Deposit Account No. 13-4895.

6. X Please charge Deposit Account No. 13-4895 in the amount of $3870.

7. ___ Priority of foreign application Serial No. ___, filed on ___ in (country) _____ is claimed under 35 U.S.C. §119.

8. _ This application is being filed by less than all of the inventors named in the prior application. Please delete the names of the following inventor(s) who are not inventors of the invention claimed in the present application:

9. X The prior application is assigned of record to 3M Innovative Properties Company.

10. X The Power of Attorney in the prior application is to:

Attention: Gregory D. Allen
3M Innovative Properties Company
3M Office of Intellectual Property Counsel
P.O. Box 33427
St. Paul, MN 55133-3427

Address all future communications to: (may only be completed by the attorney or agent of record)

3M Innovative Properties Company
3M Office of Intellectual Property Counsel
P.O. Box 33427
St. Paul, MN 55133-3427
Attn.: Gregory D. Allen

11. ___ A petition, fee, and response was filed to extend the term in the pending prior application until _____.

23 AUGUST 2001
Date

Kevin W. Raasch
Reg. No. 35,651
MUETING, RAASCH & GEBHARDT, P.A.
P.O. Box 581415
Minneapolis, MN 55458-1415
Telephone (612) 305-1220
Facsimile (612) 305-1228
Customer Number 26813

"Express Mail" mailing label number EL888393955US

Date of Deposit August 23, 2001

I hereby certify that this paper and/or fee is/are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. 1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, ATTN: Box CPA, Washington, D. C. 20231.

Name: Rachel Gagliardi-Grabau

PATENT
Docket No. 49933USA6H.031

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	HOOPMAN et al.	Group Art Unit:	1722
Serial No.:	09/520,032	Examiner:	J. Leyson
Confirmation No.:	Unknown		
Filed:	6 March 2000		

For: TOOLS TO MANUFACTURE ABRASIVE ARTICLES

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
ATTN: BOX CPA
Washington, D.C. 20231

Dear Sir:

Prior to taking up the above-identified application for examination, please amend the application as follows:

In the Specification

Please replace the paragraph beginning at page 1, line 7, with the following rewritten paragraph. Per 37 C.F.R. §1.121, this paragraph is also shown in Appendix A with notations to indicate the changes made.

--This application is a division of Application No. 09/259,488 (filed February 26, 1999) issued as U.S. Patent No. 6,076,248, which application is a division of Application No. 08/940,267 (filed September 29, 1997) issued as U.S. Patent No. 6,129,540, which is a continuation of Application No. 08/450,814 (filed May 25, 1995), abandoned, which is a division of Application No. 08/120,300 (filed September 13, 1993), abandoned. --

In the Claims

Please cancel claims 1-16, 18, 22-24, 29-32, 88-93, and 97 as requested in the Request for Continued Prosecution Application Under Rule §1.53(d), filed concurrently herewith. The amended claims are provided below in clean form. Per 37 C.F.R. §1.121, amended claims are also shown in Appendix A with notations to indicate changes made (for convenience, all pending claims, including those added hereby, are provided in Appendix A).

17. (AMENDED) The production tool of claim 16, wherein each said pyramidal shape comprises planar surfaces which intersect to form a material-included angle at a distal end of said pyramid, wherein said material-included angle is a value from 25° to 90°.

19. (AMENDED) A production tool useful to shape an abrasive slurry into an array of three-dimensional nonidentical abrasive composites, said production tool manufactured by a method comprising:

(A) preparing a master tool, the method comprising:

(1) determining angles corresponding to facing right and left planar surfaces of adjacent three-dimensional shapes and wherein each of said angles has a value as measured between its planar surface and a plane which extends in a normal direction to said major surface and contains an edge of said planar surface in contact with said major surface, by the following substeps:

(i) selecting an angle value between, but not including, 0° and 90° to establish a first right half angle of a first right planar surface of a first right-side three-dimensional shape with a random number generating means capable of randomly selecting an angle value between, but not including, 0° and 90°;

(ii) selecting an angle value between, but not including, 0° and 90° with said random number generating means to establish a first left half angle for a first left planar surface of a first left-side three-dimensional shape facing said first right planar surface of said first right-side three-dimensional shape;

(iii) proceeding along a first direction extending linearly within said first imaginary plane to a second left planar surface of a second left-side three-dimensional shape located adjacent said first left-side three-dimensional shape and using said random number generating means to select a value between, but not including, 0° and 90° to establish a second left planar angle for said second left planar surface;

(iv) using said random number generating means to select a value between, but not including, 0° and 90° for a second right planar surface of a second right-side three-dimensional shape facing said second left planar surface;

(v) proceeding along said first direction to a third right-side three-dimensional shape located adjacent said second right-side three-dimensional shape;

(vi) repeating said substeps (i), (ii), (iii), (iv), and (v), in that sequence, at least once;

(2) repeating step (1) except that the angles are determined for left and right planar surfaces of adjacent three-dimensional shapes deployed in two adjacent rows in a second direction extending linearly within said first imaginary plane, wherein said first and second directions intersect;

(3) using means to determine, for a given width of said surface of said master, locations of grooves required to be cut by a cutting means to form a series of intersecting grooves defining a plurality of three-dimensional shapes having said angles calculated by steps (1) and (2); and

(4) providing a cutting means to cut grooves in said surface of said master in correspondence to said angles calculated by steps (1) and (2) and said groove locations determined by step (3) to form a series of intersecting grooves which define a plurality of three-dimensional shapes upraised from said surface, each of said shapes being defined by a distinct and discernible boundary including specific dimensions, wherein not all said three-dimensional shapes are identical; and

(B) forming a production tool using the master tool.

20. (AMENDED) The production tool of claim 14 which is a roll.

21. (AMENDED) A production tool for manufacturing an abrasive article that comprises a major surface having deployed in fixed position thereon first and second three-dimensional abrasive composites, each of said composites comprising abrasive particles dispersed in a binder and having a shape defined by a substantially distinct and discernible boundary which includes substantially specific dimensions, wherein said first abrasive composite has a shape having specific first dimensions and said second abrasive composite has a second shape having second specific dimensions, wherein each of said abrasive composites has a boundary defined by at least four planar surfaces wherein adjacent planar surfaces of one composite meet at an edge to define an angle of intersection therebetween, wherein at least one angle of intersection of said first abrasive composite is different from all of the angles of intersection of said second composite, said production tool comprising a structure having a plurality of adjacent three-dimensional cavities form on a major surface thereof, wherein each three-dimensional cavity is defined by a substantially distinct and discernible boundary which includes substantially specific dimensions, wherein a first three-dimensional cavity has a first shape having specific first dimensions and a second three-dimensional cavity has a second shape having second specific dimensions, wherein each of said three-dimensional cavities has a boundary defined by at least four planar surfaces wherein adjacent planar surfaces of one three-dimensional cavity meet at an edge to define an angle of intersection therebetween, wherein at least one angle of intersection of said first three-dimensional cavity is different from all angles of intersection of said second three-dimensional cavity, wherein the production tool is a coating roll.

33. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a first and second plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the geometric shape and the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, wherein at least one of the angles of the first plurality is different from all of the angles of the second plurality of angles, wherein the production tool is a coating roll.

34. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a first, second, and third plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the geometric shape, the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, and the third plurality of cavities each have a third geometric shape and third plurality of angles forming the geometric shape, wherein at least one of the angles of the first plurality is different from all of the angles of the second and third plurality of angles, and wherein at least one of the angles of the second plurality is different from all of the angles of the first and third plurality of angles, wherein the production tool is a coating roll.

35. AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a first, second, third, and fourth plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the geometric shape, the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, the third plurality of cavities each have a third geometric shape and third plurality of angles forming the geometric shape, and the fourth plurality of cavities each have a fourth geometric shape and fourth plurality of angles forming the geometric shape, wherein at least one of the angles of the first plurality is different from all of the angles of the second, third, and fourth plurality of angles, wherein at least one of the angles of the second plurality is different from all of the angles of the first, third, and fourth plurality of angles, and wherein at least one of the angles of the third plurality is different from all of the angles of the first, second, and fourth plurality of angles, wherein the production tool is a coating roll.

36. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least 10% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, wherein the production tool is a coating roll.

37. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least 30% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, wherein the production tool is a coating roll.

38. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least 50% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, wherein the production tool is a coating roll.

39. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have a geometric shape, dimensions defining the cavity, and angles forming the geometric shape, wherein the angles are different in at least two of the cavities, and further wherein at least 10% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, wherein the production tool is a coating roll.

40. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, and wherein at least two adjacent cavities have at least one dimension different between the two cavities, wherein the production tool is a coating roll.

41. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defining at least a first and a second group, wherein a first group of cavities has a first shape and a second group of cavities has a second, different, shape, wherein the production tool is a coating roll.

42. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defining at least a first and a second group, wherein a first group of

cavities has a first size and a second group of cavities has a second, different, size, wherein the production tool is a coating roll.

43. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defined by substantially distinct and discernible boundaries which include substantially specific dimensions, wherein a first cavity has specific first dimensions and a second cavity has specific second dimensions, and further wherein each of said cavities has a boundary defined by at least four planar surfaces wherein adjacent planar surfaces of one cavity meet at an edge to define an angle of intersection therebetween, wherein at least one angle of intersection of said first cavity is different from all the angles of intersection of said second cavity, wherein the production tool is a coating roll.

44. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a first and second plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the geometric shape and the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, wherein at least one of the angles of the first plurality is different from all of the angles of the second plurality of angles, wherein the production tool is an engraved metal roll.

45. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a first, second, and third plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the geometric shape, the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, and the third plurality of cavities each have a third geometric shape and third plurality of angles forming the geometric shape, wherein at least one of the angles of the first plurality is different from all of the angles of the second and third plurality of angles, and wherein at least one of the angles of the second plurality is different from all of the angles of the first and third plurality of angles, wherein the production tool is an engraved metal roll.

46. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a first, second, third, and fourth plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the geometric shape, the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, the third plurality of cavities each have a third geometric shape and third plurality of angles forming the geometric shape, and the fourth plurality of cavities each have a fourth geometric shape and fourth plurality of angles forming the geometric shape, wherein at least one of the angles of the first plurality is different from all of the angles of the second, third, and fourth plurality of angles, wherein at least one of the angles of the second plurality is different from all of the angles of the first, third, and fourth plurality of angles, and wherein at least one of the angles of the third plurality is different from all of the angles of the first, second, and fourth plurality of angles, wherein the production tool is an engraved metal roll.

47. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least 10% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, wherein the production tool is an engraved metal roll.

48. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least 30% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, wherein the production tool is an engraved metal roll.

49. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least 50% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, wherein the production tool is an engraved metal roll.

50. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have a geometric shape, dimensions defining the cavity, and angles forming the geometric shape, wherein the angles are different in at least two of the cavities, and further wherein at least 10% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, wherein the production tool is an engraved metal roll.

51. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, and wherein at least two adjacent cavities have at least one dimension different between the two cavities, wherein the production tool is an engraved metal roll.

52. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defining at least a first and a second group, wherein a first group of cavities has a first shape and a second group of cavities has a second, different, shape, wherein the production tool is an engraved metal roll.

53. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defining at least a first and a second group, wherein a first group of cavities has a first size and a second group of cavities has a second, different, size, wherein the production tool is an engraved metal roll.

54. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defined by substantially distinct and discernible boundaries which include substantially specific dimensions, wherein a first cavity has specific first dimensions and a second cavity has specific second dimensions, and further wherein each of said cavities has a boundary defined by at least four planar surfaces wherein adjacent planar surfaces of one cavity meet at an edge

to define an angle of intersection therebetween, wherein at least one angle of intersection of said first cavity is different from all the angles of intersection of said second cavity, wherein the production tool is an engraved metal roll.

98. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a first and second plurality of cavities, wherein the first plurality of cavities each have a first geometric shape including a base and first plurality of base edge lengths forming the base of the geometric shape and the second plurality of cavities each have a second geometric shape including a base and second plurality of base edge lengths forming the base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second plurality of base edge lengths, production tool is a coating roll.

99. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a first, second, and third plurality of cavities, wherein the first plurality of cavities each have a first geometric shape including a base and first plurality of base edge lengths forming the base of the geometric shape, the second plurality of cavities each have a second geometric shape including a base and second plurality of base edge lengths forming the base of the geometric shape, and the third plurality of cavities each have a third geometric shape including a base and third plurality of base edge lengths forming the base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second and third plurality of base edge lengths, and wherein at least one of the base edge lengths of the second plurality is different from all of the base edge lengths of the first and third plurality of base edge lengths, production tool is a coating roll.

100. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a first, second, third, and fourth plurality of cavities, wherein the first plurality of cavities each have a first geometric shape including a base and first plurality of base edge lengths forming the base of the geometric shape, the second plurality of cavities each have a second geometric shape

including a base and second plurality of base edge lengths forming the base of the geometric shape, the third plurality of cavities each have a third geometric shape including a base and third plurality of base edge lengths forming the base of the geometric shape, and the fourth plurality of cavities each have a fourth geometric shape including a base and fourth plurality of base edge lengths forming base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second, third, and fourth plurality of base edge lengths, wherein at least one of the base edge lengths of the second plurality is different from all of the base edge lengths of the first, third, and fourth plurality of base edge lengths, and wherein at least of the base edge lengths one of the third plurality is different from all of the base edge lengths of the first, second, and fourth plurality of base edge lengths, production tool is a coating roll.

101. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 10% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, production tool is a coating roll.

102. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 30% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, production tool is a coating roll.

103. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 50% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, production tool is a coating roll.

104. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, and wherein at least two adjacent cavities have at least one base edge lengths different between the two cavities, production tool is a coating roll.

105. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a first and second plurality of cavities, wherein the first plurality of cavities each have a first geometric shape including a base and first plurality of base edge lengths forming the base of the geometric shape and the second plurality of cavities each have a second geometric shape including a base and second plurality of base edge lengths forming the base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second plurality of base edge lengths, production tool is an engraved metal roll.

106. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a first, second, and third plurality of cavities, wherein the first plurality of cavities each have a first geometric shape including a base and first plurality of base edge lengths forming the base of the geometric shape, the second plurality of cavities each have a second geometric shape including a base and second plurality of base edge lengths forming the base of the geometric shape, and the third plurality of cavities each have a third geometric shape including a base and third plurality of base edge lengths forming the base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second and third plurality of base edge lengths, and wherein at least one of the base edge lengths of the second plurality is different from all of the base edge lengths of the first and third plurality of base edge lengths, production tool is an engraved metal roll.

107. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a first, second, third, and fourth plurality of cavities, wherein the first plurality of cavities

each have a first geometric shape including a base and first plurality of base edge lengths forming the base of the geometric shape, the second plurality of cavities each have a second geometric shape including a base and second plurality of base edge lengths forming the base of the geometric shape, the third plurality of cavities each have a third geometric shape including a base and third plurality of base edge lengths forming the base of the geometric shape, and the fourth plurality of cavities each have a fourth geometric shape including a base and fourth plurality of base edge lengths forming base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second, third, and fourth plurality of base edge lengths, wherein at least one of the base edge lengths of the second plurality is different from all of the base edge lengths of the first, third, and fourth plurality of base edge lengths, and wherein at least of the base edge lengths one of the third plurality is different from all of the base edge lengths of the first, second, and fourth plurality of base edge lengths, production tool is an engraved metal roll.

108. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 10% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, production tool is an engraved metal roll.

109. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 30% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, production tool is an engraved metal roll.

110. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 50% of pairs of adjacent cavities have at

least one base edge length different between the two cavities of the pair, production tool is an engraved metal roll.

111. (AMENDED) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, and wherein at least two adjacent cavities have at least one base edge lengths different between the two cavities, production tool is an engraved metal roll.

Remarks

Please enter and consider the amendments to the specification and amended claims 17, 19-21, 25-28, 33-54, and 98-111.

Response to Restriction Requirement

Applicants' elect, with traverse, the claims of Group II (claims 14-54 and 88-111). Applicants reserve the right to pursue examination of the non-elected claims in continuation or divisional applications.

Applicants have cancelled the claims of Group I, and respectfully request reconsideration and withdrawal or modification of the restriction requirement. It is respectfully submitted that the inventions of Groups II (production tool) and III (method of making production tool) as claimed can be readily evaluated in one search without placing undue burden on the Examiner. That is, all the claims are so interrelated that a search of one group of claims will reveal art to the others.

The 35 U.S.C. §112, Second Paragraph, Rejections

Claims 16, 17, and 19-21 were rejection under 35 U.S.C. §112, second paragraph, as being indefinite. These claims have each been amended as suggested by the Examiner, thereby rendering each of the rejections moot.

The 35 U.S.C. §102(e) Rejections

Claims 14-16, 18, 22-24, 29-32, 88-93, and 97 were rejected under 35 U.S.C. §102(e) as being anticipated by Calhoun (U.S. Pat. No. 5,437,754). These claims have been cancelled in the interest of expediting prosecution. Applicants do not necessarily agree with the Examiner and reserve the right to pursue examination in a continuing application.

The 35 U.S.C. §103 Rejections

The Examiner rejected claims 17, 25-28, and 94-96 under 35 U.S.C. §103(a) as being unpatentable over Calhoun (U.S. Patent No. 5,437,754). The Examiner also rejected claims 20, 33-35, 40-46, 51-54, 98-100, 104-107, and 111 under 35 U.S.C. §103(a) as being unpatentable over Calhoun (U.S. Patent No. 5,437,754) in view of Pieper et al. (U.S. Patent No. 5,152,917). The Examiner further rejected claims 36-39, 47-50, 101-103, and 108-110 under 35 U.S.C. §103(a) as being unpatentable over Calhoun (U.S. Patent No. 5,437,754) as applied to claims 17, 25-28, and 94-96 above, and further in view of Pieper et al. (U.S. Patent No. 5,152,917).

The present application was filed on 6 March 2000 and a Continued Prosecution Application (CPA) is filed herewith. At the time of the invention of the instant application was made, the claimed invention, Calhoun (5,437,754), and Pieper et al. (5,152,917) were owned by or subject to an obligation of assignment to the same entity.

Applicants respectfully request that the rejection under 35 U.S.C. 103 be withdrawn, and notification to that effect is requested.

Obviousness Type Double Patenting Rejections

The Examiner rejected claims 19 and 21 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 15 and 16 of U.S. Patent No. 6,129,540 (Hoopman et al.). Submitted herewith is a Terminal Disclaimer with respect to 6,129,540 (Hoopman et al.). Also submitted herewith please find copies of Assignments for the present application. Applicant submits that the Terminal Disclaimer is in compliance with 37 C.F.R. 1.321(c).

Applicants respectfully request that the double patenting rejection be considered moot, and that the rejection be withdrawn.

Conclusion

The Examiner is invited to contact Applicants' Representatives at the below-listed telephone number, if there are any questions regarding this Preliminary Amendment or if prosecution of this application may be assisted thereby.

Respectfully submitted for

HOOPMAN et al.

By
Mueting, Raasch & Gebhardt, P.A.
P.O. Box 581415
Minneapolis, MN 55458-1415
Phone: (612)305-1220
Facsimile: (612)305-1228
Customer Number 26813

23 AUGUST 2001
Date

By: KWR
Kevin W. Raasch
Reg. No. 35,651
Direct Dial (612)305-1218

"Express Mail" mailing label number EL888393955US

Date of Deposit August 23, 2001

I hereby certify that this paper and/or fee is/are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. 1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, ATTN: Box CPA, Washington, D. C. 20231.

Rachel Gagliardi-Grabau
Name: Rachel Gagliardi-Grabau

APPENDIX A - SPECIFICATION/CLAIM AMENDMENTS
INCLUDING NOTATIONS TO INDICATE CHANGES MADE
Serial No.: 09/520,032
Docket No.: 49933USA6H.031

Amendments to the following are indicated by underlining what has been added and bracketing what has been deleted. Additionally, all amendments have been shaded.

In the Specification

The paragraph beginning at page 1, line 7, has been amended as follows:

This application is a division of Application No. 09/259,488 (filed February 26, 1999) [now pending] issued as U.S. Patent No. 6,072,124, which application is a division of Application No. 08/940,267 (filed September 29, 1997) [now pending] issued as U.S. Patent No. 6,129,540, which is a continuation of Application No. 08/450,814 (filed May 25, 1995), [now] abandoned, which is a division of Application No. 08/120,300 (filed September 13, 1993), [now] abandoned.

In the Claims

For convenience, all pending claims are shown below.

1. - 16. (CANCELLED)

17. (AMENDED) The production tool of claim 16, wherein each said pyramidal shape comprises planar surfaces which intersect to form a material-included angle at a distal end of said pyramid, wherein said material-included angle is a value from 25° [and] to 90°.

18. (CANCELLED)

19. (AMENDED) A production tool useful to shape an abrasive slurry into an array of three-dimensional nonidentical abrasive composites, said production tool manufactured [from a master tool, said master tool being made] by a method comprising [the steps of]:

[(A) preparing a master tool, the method comprising:]

(1) determining angles corresponding to facing right and left planar surfaces of adjacent three-dimensional shapes and wherein each of said angles has a value as measured between

its planar surface and a plane which extends in a normal direction to said major surface and contains an edge of said planar surface in contact with said major surface, by the following substeps:

(i) selecting an angle value between, but not including, 0° and 90° to establish a first right half angle of a first right planar surface of a first right-side three-dimensional shape with a random number generating means capable of randomly selecting an angle value between, but not including, 0° and 90°;

(ii) selecting an angle value between, but not including, 0° and 90° with said random number generating means to establish a first left half angle for a first left planar surface of a first left-side three-dimensional shape facing said first right planar surface of said first right-side three-dimensional shape;

(iii) proceeding along a first direction extending linearly within said first imaginary plane to a second left planar surface of a second left-side three-dimensional shape located adjacent said first left-side three-dimensional shape and using said random number generating means to select a value between, but not including, 0° and 90° to establish a second left planar angle for said second left planar surface;

(iv) using said random number generating means to select a value between, but not including, 0° and 90° for a second right planar surface of a second right-side three-dimensional shape facing said second left planar surface;

(v) proceeding along said first direction to a third right-side three-dimensional shape located adjacent said second right-side three-dimensional shape;

(vi) repeating said substeps (i), (ii), (iii), (iv), and (v), in that sequence, at least once;

(2) repeating step (1) except that the angles are determined for left and right planar surfaces of adjacent three-dimensional shapes deployed in two adjacent rows in a second direction extending linearly within said first imaginary plane, wherein said first and second directions intersect;

(3) using means to determine, for a given width of said surface of said master, locations of grooves required to be cut by a cutting means to form a series of intersecting grooves defining a plurality of three-dimensional shapes having said angles calculated by steps (1) and (2); and

(4) providing a cutting means to cut grooves in said surface of said master in correspondence to said angles calculated by steps (1) and (2) and said groove locations determined by step (3) to form a series of intersecting grooves which define a plurality of three-dimensional shapes upraised from said surface, each of said shapes being defined by a distinct and discernible boundary including specific dimensions, wherein not all said three-dimensional shapes are identical; and

(B) forming a production tool using the master tool.

20. (AMENDED) The production tool of claim 14 comprising which is a roll.

21. (AMENDED) A production tool for manufacturing an abrasive article that comprises a major surface having deployed thereon first and second three-dimensional abrasive composites, each of said composites comprising abrasive particles dispersed in a binder and having a shape defined by a substantially distinct and discernible boundary which includes substantially specific dimensions, wherein said first abrasive composite has a shape having specified first dimensions and said second abrasive composite has a second shape having second specified dimensions, wherein each of said abrasive composites has a boundary defined by at least four planar surfaces, wherein adjacent planar surfaces of one composite meet at an edge to define an angle of intersection therebetween, wherein at least one angle of intersection of said first abrasive composite is different from all of the angles of intersection of said second composite, said production tool comprising a structure having a plurality of adjacent three-dimensional cavities formed on a major surface thereof, wherein each three-dimensional cavity is defined by a substantially distinct and discernible boundary which

includes substantially specific dimensions, wherein a first three-dimensional cavity has a first shape having specific first dimensions and a second three-dimensional cavity has a second shape having second specific dimensions, wherein each of said three-dimensional cavities has a boundary defined by at least four planar surfaces, wherein adjacent planar surfaces of one three-dimensional cavity intersect at an edge to define an angle of intersection therebetween, wherein at least one angle of intersection of said first three-dimensional cavity is different from all angles of intersection of said second three-dimensional cavity, wherein [[the production tool of claim 20 comprising]] is a coating roll.

22. - 32. (CANCELLED)

33. (AMENDED) [[The production tool of claim 22,]] A production tool suitable for use in manufacturing an abrasive article comprising a first and second plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the geometric shape, and the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, wherein at least one of the angles of the first plurality is different from all of the angles of the second plurality of angles, [[which]] wherein the production tool is a coating roll.

34. (AMENDED) [[The production tool of claim 23,]] A production tool suitable for use in manufacturing an abrasive article comprising a first, second, and third plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the geometric shape, the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, and the third plurality of cavities each have a third geometric shape and third plurality of angles forming the geometric shape, wherein at

least one of the angles of the first plurality is different from all of the angles of the second and third plurality of angles and wherein at least one of the angles of the second plurality is different from all of the angles of the first and third plurality of angles [which], wherein the production tool is a coating roll.

35. (AMENDED) [The production tool of claim 24] A production tool suitable for use in manufacturing an abrasive article comprising a first, second, third, and fourth plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the geometric shape, the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, the third plurality of cavities each have a third geometric shape and third plurality of angles forming the geometric shapes and the fourth plurality of cavities each have a fourth geometric shape and fourth plurality of angles forming the geometric shapes, wherein at least one of the angles of the first plurality is different from all of the angles of the second, third, and fourth plurality of angles, wherein at least one of the angles of the second plurality is different from all of the angles of the first, third, and fourth plurality of angles and wherein at least one of the angles of the third plurality is different from all of the angles of the first, second, and fourth plurality of angles [which], wherein the production tool is a coating roll.

36. (AMENDED) [The production tool of claim 25] A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least 10% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair [which], wherein the production tool is a coating roll.

37. (AMENDED) [The production tool of claim 26] A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have

dimensions defining the cavity wherein at least 30% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pairs which wherein the production tool is a coating roll.

38. (AMENDED) The production tool of claim 27 A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity wherein at least 50% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pairs which wherein the production tool is a coating roll.

39. (AMENDED) The production tool of claim 28 A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have a geometric shape, dimensions defining the cavity and angles forming the geometric shape, wherein the angles are different on at least two of the cavities and further wherein at least 10% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pairs by which wherein the production tool is a coating roll.

40. (AMENDED) The production tool of claim 29 A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, and wherein at least two adjacent cavities have at least one dimension different between the two cavities which wherein the production tool is a coating roll.

41. (AMENDED) The production tool of claim 30 A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defining at least a first and a second group, wherein a first group of cavities has a first shape and a second group of cavities has a second, different shape which wherein the production tool is a coating roll.

42. (AMENDED) [The production tool of claim 31] A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defining at least a first and a second group wherein a first group of cavities has a first size and a second group of cavities has a second, different size, which [wherein the production tool] is a coating roll.

43. (AMENDED) [The production tool of claim 22] A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defined by substantially flat and discernible boundaries which include substantially specific dimensions, wherein a first cavity has specific first dimensions and a second cavity has specified second dimensions, and further wherein each of said cavities has a boundary defined by at least four planar surfaces where the adjacent planar surfaces of the cavity meet at an edge to define an angle of intersection therebetween, wherein at least one angle of intersection of said first cavity is different from all the angles of intersection of said second cavity, which [wherein the production tool] is a coating roll.

44. (AMENDED) [The production tool of claim 22] A production tool suitable for use in manufacturing an abrasive article comprising a first and second plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the geometric shape and the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, wherein at least one of the angles of the first plurality is different from all of the angles of the second plurality of angles [which] wherein the production tool is an engraved metal roll.

45. (AMENDED) [The production tool of claim 23] A production tool suitable for use in manufacturing an abrasive article comprising a first, second, and third plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the

geometric shape, the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, and the third plurality of cavities each have a third geometric shape and third plurality of angles forming the geometric shape, wherein at least one of the angles of the first plurality is different from all of the angles of the second and third plurality of angles, and wherein at least one of the angles of the second plurality is different from all of the angles of the first and third plurality of angles, [which] wherein the production tool is an engraved metal roll.

46. (AMENDED) [The production tool of claim 24] A production tool suitable for use in manufacturing an abrasive article comprising a first, second, third, and fourth plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the geometric shape, the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, the third plurality of cavities each have a third geometric shape and third plurality of angles forming the geometric shape, and the fourth plurality of cavities each have a fourth geometric shape and fourth plurality of angles forming the geometric shape, wherein at least one of the angles of the first plurality is different from all of the angles of the second, third, and fourth plurality of angles, wherein at least one of the angles of the second plurality is different from all of the angles of the first, third, and fourth plurality of angles, and wherein at least one of the angles of the third plurality is different from all of the angles of the first, second, and fourth plurality of angles, [which] wherein the production tool is an engraved metal roll.

47. (AMENDED) [The production tool of claim 25] A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least 10% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, [which] wherein the production tool is an engraved metal roll.

48. (AMENDED) The production tool of claim 26 A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities wherein the cavities each have dimensions defining the cavity, wherein at least 80% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pairs [which] wherein the production tool is an engraved metal roll.

49. (AMENDED) The production tool of claim 27 A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities wherein the cavities each have dimensions defining the cavity, wherein at least 50% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pairs [which] wherein the production tool is an engraved metal roll.

50. (AMENDED) The production tool of claim 28 A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities wherein the cavities each have dimensions defining the cavity and angles forming the geometric shape wherein the angles are different in at least two of the cavities and further wherein at least 80% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pairs [which] wherein the production tool is an engraved metal roll.

51. (AMENDED) The production tool of claim 29 A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities wherein the cavities each have dimensions defining the cavity, and wherein at least two adjacent cavities have at least one dimension different between the two cavities [which] wherein the production tool is an engraved metal roll.

52. (AMENDED) The production tool of claim 30 A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defining at least a first and a second group, wherein a first group of cavities has a first shape and a second group of cavities has a second different shape, [which] wherein the production tool is an engraved metal roll.

53. (AMENDED) The production tool of claim 31 A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defining at least a first and a second group, wherein a first group of cavities has a first size and a second group of cavities has a second different size, [which] wherein the production tool is an engraved metal roll.

54. (AMENDED) The production tool of claim 32 A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defined by substantially flat and discernible boundaries which include substantially specific dimensions, wherein at least one of the specific first dimensions and a second cavity has specific second dimensions, and further wherein each of said cavities has a boundary defined by at least four planar surfaces wherein adjacent planar surfaces of one cavity meet at an edge to define an angle of intersection therebetween, wherein at least one angle of intersection of said first cavity is different from all the angles of intersection of said second cavity, [which] wherein the production tool is an engraved metal roll.

55. - 93. (CANCELLED)

94. A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 10% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair.

95. A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 30% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair.

96. A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 50% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair.

97. (CANCELLED)

98. (AMENDED) The production tool of claim 91 A production tool suitable for use in manufacturing an abrasive article comprising a first and second plurality of cavities, wherein the first plurality of cavities each have a first geometric shape including a base and first plurality of base edge lengths forming the base of the geometric shape and the second plurality of cavities each have a second geometric shape including a base and second plurality of base edge lengths forming the base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second plurality of base edge lengths, which production tool is a coating roll.

99. (AMENDED) The production tool of claim 92 A production tool suitable for use in manufacturing an abrasive article comprising a first, second, and third plurality of cavities, wherein the first plurality of cavities each have a first geometric shape including a base and first plurality of base edge lengths forming the base of the geometric shape, the second plurality of cavities each have a second geometric shape including a base and second plurality of base edge

lengths forming the base of the geometric shape, and the third plurality of cavities each have a third geometric shape including a base and third plurality of base edge lengths forming the base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second and third plurality of base edge lengths, and wherein at least one of the base edge lengths of the second plurality is different from all of the base edge lengths of the first and third plurality of base edge lengths, [which] production tool is a coating roll.

100. (AMENDED) [The production tool of claim 94] A production tool suitable for use in manufacturing an abrasive article comprising a first, second, third, and fourth plurality of cavities, wherein the first plurality of cavities each have a first geometric shape including a base and first plurality of base edge lengths forming the base of the geometric shape, the second plurality of cavities each have a second geometric shape including a base and second plurality of base edge lengths forming the base of the geometric shape, the third plurality of cavities each have a third geometric shape including a base and third plurality of base edge lengths forming the base of the geometric shapes, and the fourth plurality of cavities each have a fourth geometric shape including a base and fourth plurality of base edge lengths forming a base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second, third, and fourth plurality of base edge lengths, wherein at least one of the base edge lengths of the second plurality is different from all of the base edge lengths of the first, third, and fourth plurality of base edge lengths, and wherein at least of the base edge lengths one of the third plurality is different from all of the base edge lengths of the first, second, and fourth plurality of base edge lengths, [which] production tool is a coating roll.

101. (AMENDED) [The production tool of claim 94] A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least

10% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, which production tool is a coating roll.

102. (AMENDED) The production tool of claim 95 A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 50% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, which production tool is a coating roll.

103. (AMENDED) The production tool of claim 96 A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 50% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, which production tool is a coating roll.

104. (AMENDED) The production tool of claim 97 A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, and wherein at least two adjacent cavities have at least one base edge length different between the two cavities, which production tool is a coating roll.

105. (AMENDED) The production tool of claim 91 A production tool suitable for use in manufacturing an abrasive article comprising a first and second plurality of cavities, wherein the first plurality of cavities each have a first geometric shape including a base and first plurality of base edge lengths forming the base of the geometric shape and the second plurality of cavities each have a second geometric shape including a base and second plurality of base edge lengths forming

the base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second plurality of base edge lengths, [which] production tool is an engraved metal roll.

106. (AMENDED) [The production tool of claim 92] A production tool suitable for use in manufacturing an abrasive article comprising a first, second, and third plurality of cavities, wherein the first plurality of cavities each have a first geometric shape including a base and first plurality of base edge lengths forming the base of the geometric shape, the second plurality of cavities each have a second geometric shape including a base and second plurality of base edge lengths forming the base of the geometric shapes and the third plurality of cavities each have a third geometric shape including a base and third plurality of base edge lengths forming the base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second and third plurality of base edge lengths, and wherein at least one of the base edge lengths of the second plurality is different from all of the base edge lengths of the first and third plurality of base edge lengths, [which] production tool is an engraved metal roll.

107. (AMENDED) [The production tool of claim 93] A production tools suitable for use in manufacturing an abrasive article comprising a first, second, third, and fourth plurality of cavities, wherein the first plurality of cavities each have a first geometric shape including a base and first plurality of base edge lengths forming the base of the geometric shape, the second plurality of cavities each have a second geometric shape including a base and second plurality of base edge lengths forming the base of the geometric shapes, the third plurality of cavities each have a third geometric shape including a base and third plurality of base edge lengths forming the base of the geometric shape, and the fourth plurality of cavities each have a fourth geometric shape including a base and fourth plurality of base edge lengths forming base of the geometric shapes, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the

second, third, and fourth plurality of base edge lengths, wherein at least one of the base edge lengths of the second plurality is different from all of the base edge lengths of the first, third, and fourth plurality of base edge lengths, and wherein at least of the base edge lengths one of the third plurality is different from all of the base edge lengths of the first, second, and fourth plurality of base edge lengths, [which] production tool is an engraved metal roll.

108. (AMENDED) [The production tool of claim 94] A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 10% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, [which] production tool is an engraved metal roll.

109. (AMENDED) [The production tool of claim 95] A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 30% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, [which] production tool is an engraved metal roll.

110. (AMENDED) [The production tool of claim 96] A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 50% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, [which] production tool is an engraved metal roll.

111. (AMENDED) [The production tool of claim 97] A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the

cavities each have dimensions defining three axially-directed dimensions including base edge lengths and wherein at least two adjacent cavities have at least one base edge length different between the two cavities, which production tool is an engraved metal roll.

112. - 132. (CANCELLED)